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SEQUENCE LISTING

<110> Nam, Jae-Hwan  
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Emerson, Suzanne  
Purcell, Robert

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His Val Thr Asn Asp Cys Pro Asn Ser Ser Ile Val Tyr Glu Ala Ala  
 370 375 380

Asp Ala Ile Leu His Thr Pro Gly Cys Val Pro Cys Val Arg Glu Gly  
 385 390 395 400

Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr Val Ala Thr Arg  
 405 410 415

Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His Ile Asp Leu Leu  
 420 425 430

Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val Gly Asp Leu Cys  
 435 440 445

Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe Ser Pro Arg Arg  
 450 455 460

His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr Pro Gly His Ile  
 465 470 475 480

Thr Gly His Arg Met Ala Trp Asp Met Met Met Asn Trp Ser Pro Thr  
 485 490 495

Ala Ala Leu Val Val Ala Gln Leu Leu Arg Ile Pro Gln Ala Ile Met  
 500 505 510

Asp Met Ile Ala Gly Ala His Trp Gly Val Leu Ala Gly Ile Ala Tyr  
 515 520 525

Phe Ser Met Val Gly Asn Trp Ala Lys Val Leu Val Val Leu Leu Leu  
530 535 540

Phe Ala Gly Val Asp Ala Glu Thr His Val Thr Gly Gly Asn Ala Gly  
545 550 555 560

Arg Thr Thr Ala Gly Leu Val Gly Leu Leu Thr Pro Gly Ala Lys Gln  
565 570 575

Asn Ile Gln Leu Ile Asn Thr Asn Gly Ser Trp His Ile Asn Ser Thr  
580 585 590

Ala Leu Asn Cys Asn Glu Ser Leu Asn Thr Gly Trp Leu Ala Gly Leu  
595 600 605

Phe Tyr Gln His Lys Phe Asn Ser Ser Gly Cys Pro Glu Arg Leu Ala  
610 615 620

Ser Cys Arg Arg Leu Thr Asp Phe Ala Gln Gly Trp Gly Pro Ile Ser  
625 630 635 640

Tyr Ala Asn Gly Ser Gly Leu Asp Glu Arg Pro Tyr Cys Trp His Tyr  
645 650 655

Pro Pro Arg Pro Cys Gly Ile Val Pro Ala Lys Ser Val Cys Gly Pro  
660 665 670

Val Tyr Cys Phe Thr Pro Ser Pro Val Val Val Gly Thr Thr Asp Arg  
675 680 685

Ser Gly Ala Pro Thr Tyr Ser Trp Gly Ala Asn Asp Thr Asp Val Phe  
690 695 700

Val Leu Asn Asn Thr Arg Pro Pro Leu Gly Asn Trp Phe Gly Cys Thr  
705 710 715 720

Trp Met Asn Ser Thr Gly Phe Thr Lys Val Cys Gly Ala Pro Pro Cys  
725 730 735

Val Ile Gly Gly Val Gly Asn Asn Thr Leu Leu Cys Pro Thr Asp Cys  
740 745 750

Phe Arg Lys His Pro Glu Ala Thr Tyr Ser Arg Cys Gly Ser Gly Pro  
755 760 765

Trp Ile Thr Pro Arg Cys Met Val Asp Tyr Pro Tyr Arg Leu Trp His  
770 775 780



Tyr Pro Cys Thr Ile Asn Tyr Thr Ile Phe Lys Val Arg Met Tyr Val	785	790	795	800
Gly Gly Val Glu His Arg Leu Glu Ala Ala Cys Asn Trp Thr Arg Gly	805	810	815	
Glu Arg Cys Asp Leu Glu Asp Arg Asp Arg Ser Glu Leu Ser Pro Leu	820	825	830	
Leu Leu Ser Thr Thr Gln Trp Gln Val Leu Pro Cys Ser Phe Thr Thr	835	840	845	
Leu Pro Ala Leu Ser Thr Gly Leu Ile His Leu His Gln Asn Ile Val	850	855	860	
Asp Val Gln Tyr Leu Tyr Gly Val Gly Ser Ser Ile Ala Ser Trp Ala	865	870	875	880
Ile Lys Trp Glu Tyr Val Val Leu Leu Phe Leu Leu Leu Ala Asp Ala	885	890	895	
Arg Val Cys Ser Cys Leu Trp Met Met Leu Leu Ile Ser Gln Ala Glu	900	905	910	
Ala Ile Gln Tyr Gly Ser Gly Glu Val Val Met Met Gly Asn Leu Leu	915	920	925	
Thr His Asn Asn Ile Glu Val Val Thr Tyr Phe Leu Leu Leu Tyr Leu	930	935	940	
Leu Leu Arg Glu Glu Ser Val Lys Lys Trp Val Leu Leu Leu Tyr His	945	950	955	960
Ile Leu Val Val His Pro Ile Lys Ser Val Ile Val Ile Leu Leu Met	965	970	975	
Ile Gly Asp Val Val Lys Ala Asp Ser Gly Gly Gln Glu Tyr Leu Gly	980	985	990	
Lys Ile Asp Leu Cys Phe Thr Thr Val Val Leu Ile Val Ile Gly Leu	995	1000	1005	
Ile Ile Ala Arg Arg Asp Pro Thr Ile Val Pro Leu Val Thr Ile Met	1010	1015	1020	
Ala Ala Leu Arg Val Thr Glu Leu Thr His Gln Pro Gly Val Asp Ile	1025	1030	1035	1040

Ala Val Ala Val Met Thr Ile Thr Leu Leu Met Val Ser Tyr Val Thr			
1045	1050	1055	
Asp Tyr Phe Arg Tyr Lys Lys Trp Leu Gln Cys Ile Leu Ser Leu Val			
1060	1065	1070	
Ser Gly Val Phe Leu Ile Arg Ser Leu Ile Tyr Leu Gly Arg Ile Glu			
1075	1080	1085	
Met Pro Glu Val Thr Ile Pro Asn Trp Arg Pro Leu Thr Leu Ile Leu			
1090	1095	1100	
Leu Tyr Leu Ile Ser Thr Thr Ile Val Thr Arg Trp Lys Val Asp Val			
1105	1110	1115	1120
Ala Gly Leu Leu Leu Gln Cys Val Pro Ile Leu Leu Leu Val Thr Thr			
1125	1130	1135	
Leu Trp Ala Asp Phe Leu Thr Leu Ile Leu Ile Leu Pro Thr Tyr Glu			
1140	1145	1150	
Leu Val Lys Leu Tyr Tyr Leu Lys Thr Val Arg Thr Asp Ile Glu Arg			
1155	1160	1165	
Ser Trp Leu Gly Gly Ile Asp Tyr Thr Arg Val Asp Ser Ile Tyr Asp			
1170	1175	1180	
Val Asp Glu Ser Gly Glu Gly Val Tyr Leu Phe Pro Ser Arg Gln Lys			
1185	1190	1195	1200
Ala Gln Gly Asn Phe Ser Ile Leu Leu Pro Leu Ile Lys Ala Thr Leu			
1205	1210	1215	
Ile Ser Cys Val Ser Ser Lys Trp Gln Leu Ile Tyr Met Ser Tyr Leu			
1220	1225	1230	
Thr Leu Asp Phe Met Tyr Tyr Met His Arg Lys Val Ile Glu Glu Ile			
1235	1240	1245	
Ser Gly Gly Thr Asn Ile Ile Ser Arg Leu Val Ala Ala Leu Ile Glu			
1250	1255	1260	
Leu Asn Trp Ser Met Glu Glu Glu Glu Ser Lys Gly Leu Lys Lys Phe			
1265	1270	1275	1280
Tyr Leu Leu Ser Gly Arg Leu Arg Asn Leu Ile Ile Lys His Lys Val			
1285	1290	1295	

Arg Asn Glu Thr Val Ala Ser Trp Tyr Gly Glu Glu Glu Val Tyr Gly			
1300	1305	1310	
Met Pro Lys Ile Met Thr Ile Ile Lys Ala Ser Thr Leu Ser Lys Ser			
1315	1320	1325	
Arg His Cys Ile Ile Cys Thr Val Cys Glu Gly Arg Glu Trp Lys Gly			
1330	1335	1340	
Gly Thr Cys Pro Lys Cys Gly Arg His Gly Lys Pro Ile Thr Cys Gly			
1345	1350	1355	1360
Met Ser Leu Ala Asp Phe Glu Glu Arg His Tyr Lys Arg Ile Phe Ile			
1365	1370	1375	
Arg Glu Gly Asn Phe Glu Gly Met Cys Ser Arg Cys Gln Gly Lys His			
1380	1385	1390	
Arg Arg Phe Glu Met Asp Arg Glu Pro Lys Ser Ala Arg Tyr Cys Ala			
1395	1400	1405	
Glu Cys Asn Arg Leu His Pro Ala Glu Glu Gly Asp Phe Trp Ala Glu			
1410	1415	1420	
Ser Ser Met Leu Gly Leu Lys Ile Thr Tyr Phe Ala Leu Met Asp Gly			
1425	1430	1435	1440
Lys Val Tyr Asp Ile Thr Glu Trp Ala Gly Cys Gln Arg Val Gly Ile			
1445	1450	1455	
Ser Pro Asp Thr His Arg Val Pro Cys His Ile Ser Phe Gly Ser Arg			
1460	1465	1470	
Met Pro Phe Arg Gln Glu Tyr Asn Gly Phe Val Gln Tyr Thr Ala Arg			
1475	1480	1485	
Gly Gln Leu Phe Leu Arg Asn Leu Pro Val Leu Ala Thr Lys Val Lys			
1490	1495	1500	
Met Leu Met Val Gly Asn Leu Gly Glu Glu Ile Gly Asn Leu Glu His			
1505	1510	1515	1520
Leu Gly Trp Ile Leu Arg Gly Pro Ala Val Cys Lys Lys Ile Thr Glu			
1525	1530	1535	
His Glu Lys Cys His Ile Asn Ile Leu Asp Lys Leu Thr Ala Phe Phe			
1540	1545	1550	

Gly Ile Met Pro Arg Gly Thr Thr Pro Arg Ala Pro Val Arg Phe Pro  
 1555 1560 1565

Thr Ser Leu Leu Lys Val Arg Arg Gly Leu Glu Thr Gly Trp Ala Tyr  
 1570 1575 1580

Thr His Gln Gly Gly Ile Ser Ser Val Asp His Val Thr Ala Gly Lys  
 1585 1590 1595 1600

Asp Leu Leu Val Cys Asp Ser Met Gly Arg Thr Arg Val Val Cys Gln  
 1605 1610 1615

Ser Asn Asn Arg Leu Thr Asp Glu Thr Glu Tyr Gly Val Lys Thr Asp  
 1620 1625 1630

Ser Gly Cys Pro Asp Gly Ala Arg Cys Tyr Val Leu Asn Pro Glu Ala  
 1635 1640 1645

Val Asn Ile Ser Gly Ser Lys Gly Ala Val Val His Leu Gln Lys Thr  
 1650 1655 1660

Gly Gly Glu Phe Thr Cys Val Thr Ala Ser Gly Thr Pro Ala Phe Phe  
 1665 1670 1675 1680

Asp Leu Lys Asn Leu Lys Gly Trp Ser Gly Leu Pro Ile Phe Glu Ala  
 1685 1690 1695

Ser Ser Gly Arg Val Val Gly Arg Val Lys Val Gly Lys Asn Glu Glu  
 1700 1705 1710

Ser Lys Pro Thr Lys Ile Met Ser Gly Ile Gln Thr Val Ser Lys Asn  
 1715 1720 1725

Thr Ala Asp Leu Thr Glu Met Val Lys Lys Ile Thr Ser Met Asn Arg  
 1730 1735 1740

Gly Asp Phe Lys Gln Ile Thr Leu Ala Thr Gly Ala Gly Lys Thr Thr  
 1745 1750 1755 1760

Glu Leu Pro Lys Ala Val Ile Glu Glu Ile Gly Arg His Lys Arg Val  
 1765 1770 1775

Leu Val Leu Ile Pro Leu Arg Ala Ala Ala Glu Ser Val Tyr Gln Tyr  
 1780 1785 1790

Met Arg Leu Lys His Pro Ser Ile Ser Phe Asn Leu Arg Ile Gly Asp  
 1795 1800 1805

Met Lys Glu Gly Asp Met Ala Thr Gly Ile Thr Tyr Ala Ser Tyr Gly  
 1810 1815 1820

Tyr Phe Cys Gln Met Pro Gln Pro Lys Leu Arg Ala Ala Met Val Glu  
 1825 1830 1835 1840

Tyr Ser Tyr Ile Phe Leu Asp Glu Tyr His Cys Ala Thr Pro Glu Gln  
 1845 1850 1855

Leu Ala Ile Ile Gly Lys Ile His Arg Phe Ser Glu Ser Ile Arg Val  
 1860 1865 1870

Val Ala Met Thr Ala Thr Pro Ala Gly Ser Val Thr Thr Thr Gly Gln  
 1875 1880 1885

Lys His Pro Ile Glu Glu Phe Ile Ala Pro Glu Val Met Lys Gly Glu  
 1890 1895 1900

Asp Leu Gly Ser Gln Phe Leu Asp Ile Ala Gly Leu Lys Ile Pro Val  
 1905 1910 1915 1920

Asp Glu Met Lys Gly Asn Met Leu Val Phe Val Pro Thr Arg Asn Met  
 1925 1930 1935

Ala Val Glu Val Ala Lys Lys Leu Lys Ala Lys Gly Tyr Asn Ser Gly  
 1940 1945 1950

Tyr Tyr Tyr Ser Gly Glu Asp Pro Ala Asn Leu Arg Val Val Thr Ser  
 1955 1960 1965

Gln Ser Pro Tyr Val Ile Val Ala Thr Asn Ala Ile Glu Ser Gly Val  
 1970 1975 1980

Thr Leu Pro Asp Leu Asp Thr Val Ile Asp Thr Gly Leu Lys Cys Glu  
 1985 1990 1995 2000

Lys Arg Val Arg Val Ser Ser Lys Ile Pro Phe Ile Val Thr Gly Leu  
 2005 2010 2015

Lys Arg Met Ala Val Thr Val Gly Glu Gln Ala Gln Arg Arg Gly Arg  
 2020 2025 2030

Val Gly Arg Val Lys Pro Gly Arg Tyr Tyr Arg Ser Gln Glu Thr Ala  
 2035 2040 2045

Thr Gly Ser Lys Asp Tyr His Tyr Asp Leu Leu Gln Ala Gln Arg Tyr  
 2050 2055 2060

Gly Ile Glu Asp Gly Ile Asn Val Thr Lys Ser Phe Arg Glu Met Asn			
2065	2070	2075	2080
Tyr Asp Trp Ser Leu Tyr Glu Glu Asp Ser Leu Leu Ile Thr Gln Leu			
2085	2090	2095	
Glu Ile Leu Asn Asn Leu Leu Ile Ser Glu Asp Leu Pro Ala Ala Val			
2100	2105	2110	
Lys Asn Ile Met Ala Arg Thr Asp His Pro Glu Pro Ile Gln Leu Ala			
2115	2120	2125	
Tyr Asn Ser Tyr Glu Val Gln Val Pro Val Leu Phe Pro Lys Ile Arg			
2130	2135	2140	
Asn Gly Glu Val Thr Asp Thr Tyr Glu Asn Tyr Ser Phe Leu Asn Ala			
2145	2150	2155	2160
Arg Lys Leu Gly Glu Asp Val Pro Val Tyr Ile Tyr Ala Thr Glu Asp			
2165	2170	2175	
Glu Asp Leu Ala Val Asp Leu Leu Gly Leu Asp Trp Pro Asp Pro Gly			
2180	2185	2190	
Asn Gln Gln Val Val Glu Thr Gly Lys Ala Leu Lys Gln Val Thr Gly			
2195	2200	2205	
Leu Ser Ser Ala Glu Asn Ala Leu Leu Val Ala Leu Phe Gly Tyr Val			
2210	2215	2220	
Gly Tyr Gln Ala Leu Ser Lys Arg His Val Pro Met Ile Thr Asp Ile			
2225	2230	2235	2240
Tyr Thr Ile Glu Asp Gln Arg Leu Glu Asp Thr Thr His Leu Gln Tyr			
2245	2250	2255	
Ala Pro Asn Ala Ile Lys Thr Asp Gly Thr Glu Thr Glu Leu Lys Glu			
2260	2265	2270	
Leu Ala Ser Gly Asp Val Glu Lys Ile Met Gly Ala Ile Ser Asp Tyr			
2275	2280	2285	
Ala Ala Gly Gly Leu Glu Phe Val Lys Ser Gln Ala Glu Lys Ile Lys			
2290	2295	2300	
Thr Ala Pro Leu Phe Lys Glu Asn Ala Glu Ala Ala Lys Gly Tyr Val			
2305	2310	2315	2320

Gln Lys Phe Ile Asp Ser Leu Ile Glu Asn Lys Glu Glu Ile Ile Arg  
 2325 2330 2335  
 Tyr Gly Leu Trp Gly Thr His Thr Ala Leu Tyr Lys Ser Ile Ala Ala  
 2340 2345 2350  
 Arg Leu Gly His Glu Thr Ala Phe Ala Thr Leu Val Leu Lys Trp Leu  
 2355 2360 2365  
 Ala Phe Gly Gly Glu Ser Val Ser Asp His Val Lys Gln Ala Ala Val  
 2370 2375 2380  
 Asp Leu Val Val Tyr Tyr Val Met Asn Lys Pro Ser Phe Pro Gly Asp  
 2385 2390 2395 2400  
 Ser Glu Thr Gln Gln Glu Gly Arg Arg Phe Val Ala Ser Leu Phe Ile  
 2405 2410 2415  
 Ser Ala Leu Ala Thr Tyr Thr Tyr Lys Thr Trp Asn Tyr His Asn Leu  
 2420 2425 2430  
 Ser Lys Val Val Glu Pro Ala Leu Ala Tyr Leu Pro Tyr Ala Thr Ser  
 2435 2440 2445  
 Ala Leu Lys Met Phe Thr Pro Thr Arg Leu Glu Ser Val Val Ile Leu  
 2450 2455 2460  
 Ser Thr Thr Ile Tyr Lys Thr Tyr Leu Ser Ile Arg Lys Gly Lys Ser  
 2465 2470 2475 2480  
 Asp Gly Leu Leu Gly Thr Gly Ile Ser Ala Ala Met Glu Ile Leu Ser  
 2485 2490 2495  
 Gln Asn Pro Val Ser Val Gly Ile Ser Val Met Leu Gly Val Gly Ala  
 2500 2505 2510  
 Ile Ala Ala His Asn Ala Ile Glu Ser Ser Glu Gln Lys Arg Thr Leu  
 2515 2520 2525  
 Leu Met Lys Val Phe Val Lys Asn Phe Leu Asp Gln Ala Ala Thr Asp  
 2530 2535 2540  
 Glu Leu Val Lys Glu Asn Pro Glu Lys Ile Ile Met Ala Leu Phe Glu  
 2545 2550 2555 2560  
 Ala Val Gln Thr Ile Gly Asn Pro Leu Arg Leu Ile Tyr His Leu Tyr  
 2565 2570 2575

Gly Val Tyr Tyr Lys Gly Trp Glu Ala Lys Glu Leu Ser Glu Arg Thr			
2580	2585	2590	
Ala Gly Arg Asn Leu Phe Thr Leu Ile Met Phe Glu Ala Phe Glu Leu			
2595	2600	2605	
Leu Gly Met Asp Ser Gln Gly Lys Ile Arg Asn Leu Ser Gly Asn Tyr			
2610	2615	2620	
Ile Leu Asp Leu Ile Tyr Gly Leu His Lys Gln Ile Asn Arg Gly Leu			
2625	2630	2635	2640
Lys Lys Met Val Leu Gly Trp Ala Pro Ala Pro Phe Ser Cys Asp Trp			
2645	2650	2655	
Thr Pro Ser Asp Glu Arg Ile Arg Leu Pro Thr Asp Asn Tyr Leu Arg			
2660	2665	2670	
Val Glu Thr Arg Cys Pro Cys Gly Tyr Glu Met Lys Ala Phe Lys Asn			
2675	2680	2685	
Val Gly Gly Lys Leu Thr Lys Val Glu Glu Ser Gly Pro Phe Leu Cys			
2690	2695	2700	
Arg Asn Arg Pro Gly Arg Gly Pro Val Asn Tyr Arg Val Thr Lys Tyr			
2705	2710	2715	2720
Tyr Asp Asp Asn Leu Arg Glu Ile Lys Pro Val Ala Lys Leu Glu Gly			
2725	2730	2735	
Gln Val Glu His Tyr Tyr Lys Gly Val Thr Ala Lys Ile Asp Tyr Ser			
2740	2745	2750	
Lys Gly Lys Met Leu Leu Ala Thr Asp Lys Trp Glu Val Glu His Gly			
2755	2760	2765	
Val Ile Thr Arg Leu Ala Lys Arg Tyr Thr Gly Val Gly Phe Asn Gly			
2770	2775	2780	
Ala Tyr Leu Gly Asp Glu Pro Asn His Arg Ala Leu Val Glu Arg Asp			
2785	2790	2795	2800
Cys Ala Thr Ile Thr Lys Asn Thr Val Gln Phe Leu Lys Met Lys Lys			
2805	2810	2815	
Gly Cys Ala Phe Thr Tyr Asp Leu Thr Ile Ser Asn Leu Thr Arg Leu			
2820	2825	2830	



Ile Glu Leu Val His Arg Asn Asn Leu Glu Glu Lys Glu Ile Pro Thr			
2835	2840	2845	
Ala Thr Val Thr Thr Trp Leu Ala Tyr Thr Phe Val Asn Glu Asp Val			
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Gly Thr Ile Lys Pro Val Leu Gly Glu Arg Val Ile Pro Asp Pro Val			
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Val Asp Ile Asn Leu Gln Pro Glu Val Gln Val Asp Thr Ser Glu Val			
2885	2890	2895	
Gly Ile Thr Ile Ile Gly Arg Glu Thr Leu Met Thr Thr Gly Val Thr			
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Pro Val Leu Glu Lys Val Glu Pro Asp Ala Ser Asp Asn Gln Asn Ser			
2915	2920	2925	
Val Lys Ile Gly Leu Asp Glu Gly Asn Tyr Pro Gly Pro Gly Ile Gln			
2930	2935	2940	
Thr His Thr Leu Thr Glu Glu Ile His Asn Arg Asp Ala Arg Pro Phe			
2945	2950	2955	2960
Ile Met Ile Leu Gly Ser Arg Asn Ser Ile Ser Asn Arg Ala Lys Thr			
2965	2970	2975	
Ala Arg Asn Ile Asn Leu Tyr Thr Gly Asn Asp Pro Arg Glu Ile Arg			
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Asp Leu Met Ala Ala Gly Arg Met Leu Val Val Ala Leu Arg Asp Val			
2995	3000	3005	
Asp Pro Glu Leu Ser Glu Met Val Asp Phe Lys Gly Thr Phe Leu Asp			
3010	3015	3020	
Arg Glu Ala Leu Glu Ala Leu Ser Leu Gly Gln Pro Lys Pro Lys Gln			
3025	3030	3035	3040
Val Thr Lys Glu Ala Val Arg Asn Leu Ile Glu Gln Lys Lys Asp Val			
3045	3050	3055	
Glu Ile Pro Asn Trp Phe Ala Ser Asp Asp Pro Val Phe Leu Glu Val			
3060	3065	3070	
Ala Leu Lys Asn Asp Lys Tyr Tyr Leu Val Gly Asp Val Gly Glu Val			
3075	3080	3085	

Lys Asp Gln Ala Lys Ala Leu Gly Ala Thr Asp Gln Thr Arg Ile Ile  
 3090 3095 3100

Lys Glu Val Gly Ser Arg Thr Tyr Ala Met Lys Leu Ser Ser Trp Phe  
 3105 3110 3115 3120

Leu Gln Ala Ser Asn Lys Gln Met Ser Leu Thr Pro Leu Phe Glu Glu  
 3125 3130 3135

Leu Leu Leu Arg Cys Pro Pro Ala Thr Lys Ser Asn Lys Gly His Met  
 3140 3145 3150

Ala Ser Ala Tyr Gln Leu Ala Gln Gly Asn Trp Glu Pro Leu Gly Cys  
 3155 3160 3165

Gly Val His Leu Gly Thr Ile Pro Ala Arg Arg Val Lys Ile His Pro  
 3170 3175 3180

Tyr Glu Ala Tyr Leu Lys Leu Lys Asp Phe Ile Glu Glu Glu Glu Lys  
 3185 3190 3195 3200

Lys Pro Arg Val Lys Asp Thr Val Ile Arg Glu His Asn Lys Trp Ile  
 3205 3210 3215

Leu Lys Lys Ile Arg Phe Gln Gly Asn Leu Asn Thr Lys Lys Met Leu  
 3220 3225 3230

Asn Pro Gly Lys Leu Ser Glu Gln Leu Asp Arg Glu Gly Arg Lys Arg  
 3235 3240 3245

Asn Ile Tyr Asn His Gln Ile Gly Thr Ile Met Ser Ser Ala Gly Ile  
 3250 3255 3260

Arg Leu Glu Lys Leu Pro Ile Val Arg Ala Gln Thr Asp Thr Lys Thr  
 3265 3270 3275 3280

Phe His Glu Ala Ile Arg Asp Lys Ile Asp Lys Ser Glu Asn Arg Gln  
 3285 3290 3295

Asn Pro Glu Leu His Asn Lys Leu Leu Glu Ile Phe His Thr Ile Ala  
 3300 3305 3310

Gln Pro Thr Leu Lys His Thr Tyr Gly Glu Val Thr Trp Glu Gln Leu  
 3315 3320 3325

Glu Ala Gly Ile Asn Arg Lys Gly Ala Ala Gly Phe Leu Glu Lys Lys  
 3330 3335 3340

Asn Ile Gly Glu Val Leu Asp Ser Glu Lys His Leu Val Glu Gln Leu			
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Val Arg Asp Leu Lys Ala Gly Arg Lys Ile Lys Tyr Tyr Glu Thr Ala			
3365	3370	3375	
Ile Pro Lys Asn Glu Lys Arg Asp Val Ser Asp Asp Trp Gln Ala Gly			
3380	3385	3390	
Asp Leu Val Val Glu Lys Arg Pro Arg Val Ile Gln Tyr Pro Glu Ala			
3395	3400	3405	
Lys Thr Arg Leu Ala Ile Thr Lys Val Met Tyr Asn Trp Val Lys Gln			
3410	3415	3420	
Gln Pro Val Val Ile Pro Gly Tyr Glu Gly Lys Thr Pro Leu Phe Asn			
3425	3430	3435	3440
Ile Phe Asp Lys Val Arg Lys Glu Trp Asp Ser Phe Asn Glu Pro Val			
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Ala Val Ser Phe Asp Thr Lys Ala Trp Asp Thr Gln Val Thr Ser Lys			
3460	3465	3470	
Asp Leu Gln Leu Ile Gly Glu Ile Gln Lys Tyr Tyr Tyr Lys Lys Glu			
3475	3480	3485	
Trp His Lys Phe Ile Asp Thr Ile Thr Asp His Met Thr Glu Val Pro			
3490	3495	3500	
Val Ile Thr Ala Asp Gly Glu Val Tyr Ile Arg Asn Gly Gln Arg Gly			
3505	3510	3515	3520
Ser Gly Gln Pro Asp Thr Ser Ala Gly Asn Ser Met Leu Asn Val Leu			
3525	3530	3535	
Thr Met Met Tyr Ala Phe Cys Glu Ser Thr Gly Val Pro Tyr Lys Ser			
3540	3545	3550	
Phe Asn Arg Val Ala Arg Ile His Val Cys Gly Asp Asp Gly Phe Leu			
3555	3560	3565	
Ile Thr Glu Lys Gly Leu Gly Leu Lys Phe Ala Asn Lys Gly Met Gln			
3570	3575	3580	
Ile Leu His Glu Ala Gly Lys Pro Gln Lys Ile Thr Glu Gly Glu Lys			
3585	3590	3595	3600

Met Lys Val Ala Tyr Arg Phe Glu Asp Ile Glu Phe Cys Ser His Thr  
3605 3610 3615

Pro Val Pro Val Arg Trp Ser Asp Asn Thr Ser Ser His Met Ala Gly  
3620 3625 3630

Arg Asp Thr Ala Val Ile Leu Ser Lys Met Ala Thr Arg Leu Asp Ser  
3635 3640 3645

Ser Gly Glu Arg Gly Thr Thr Ala Tyr Glu Lys Ala Val Ala Phe Ser  
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Phe Leu Leu Met Tyr Ser Trp Asn Pro Leu Val Arg Arg Ile Cys Leu  
3665 3670 3675 3680

Leu Val Leu Ser Gln Gln Pro Glu Thr Asp Pro Ser Lys His Ala Thr  
3685 3690 3695

Tyr Tyr Tyr Lys Gly Asp Pro Ile Gly Ala Tyr Lys Asp Val Ile Gly  
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Arg Asn Leu Ser Glu Leu Lys Arg Thr Gly Phe Glu Lys Leu Ala Asn  
3715 3720 3725

Leu Asn Leu Ser Leu Ser Thr Leu Gly Ile Trp Thr Lys His Thr Ser  
3730 3735 3740

Lys Arg Ile Ile Gln Asp Cys Val Ala Ile Gly Lys Glu Glu Gly Asn  
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Trp Leu Val Asn Ala Asp Arg Leu Ile Ser Ser Lys Thr Gly His Leu  
3765 3770 3775

Tyr Ile Pro Asp Lys Gly Phe Thr Leu Gln Gly Lys His Tyr Glu Gln  
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Leu Gln Leu Arg Thr Glu Thr Asn Pro Val Met Gly Val Gly Thr Glu  
3795 3800 3805

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<211> 9711

<212> DNA

<213> Hepatitis C virus

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aagactgggt cctttcttgg ataaacccac tctatgcccc gccatttggg cgtgcccccg 240  
caagactgct agccgagtag cgttgggttg cgaaaggcct tgtggtactg cctgataggg 300  
tgcttgcgag tgccccggga ggtctcgtag accgtgcacc atgagcacia atcctaaacc 360  
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<211> 3033

<212> PRT

<213> Hepatitis C virus

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      20              25              30

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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
      35              40              45

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Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
      50              55              60

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Ile Pro Lys Asp Arg Arg Ser Thr Gly Lys Ser Trp Gly Lys Pro Gly
      65              70              75              80

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Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
      85              90              95

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Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Asn Asp Pro  
 100 105 110

Arg His Arg Ser Arg Asn Val Gly Lys Val Ile Asp Thr Leu Thr Cys  
 115 120 125

Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Val Val Gly Ala Pro Leu  
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Gly Gly Val Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp  
 145 150 155 160

Gly Val Asn Phe Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile  
 165 170 175

Phe Leu Leu Ala Leu Leu Ser Cys Ile Thr Thr Pro Val Ser Ala Ala  
 180 185 190

Glu Val Lys Asn Ile Ser Thr Gly Tyr Met Val Thr Asn Asp Cys Thr  
 195 200 205

Asn Asp Ser Ile Thr Trp Gln Leu Gln Ala Ala Val Leu His Val Pro  
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Gly Cys Val Pro Cys Glu Lys Val Gly Asn Ala Ser Gln Cys Trp Ile  
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Pro Val Ser Pro Asn Val Ala Val Gln Arg Pro Gly Ala Leu Thr Gln  
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Gly Leu Arg Thr His Ile Asp Met Val Val Met Ser Ala Thr Leu Cys  
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Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Gly Val Met Leu Ala Ala  
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Gln Met Phe Ile Val Ser Pro Gln His His Trp Phe Val Gln Asp Cys  
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 850 855 860

Ala Pro Pro Met Gln Val Arg Gly Gly Arg Asp Gly Ile Ile Trp Ala  
 865 870 875 880

Val Ala Ile Phe Tyr Pro Gly Val Val Phe Asp Ile Thr Lys Trp Leu  
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Tyr Ser Ser Ala Glu Gly Asp Leu Val Gly Trp Pro Ser Pro Pro Gly  
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Val Arg Leu Thr Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr	1345	1350	1355
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Glu Asn Phe Ala Tyr Leu Thr Ala Tyr Gln Ala Thr Val Cys Ala Arg	1585	1590	1595 1600
Ala Lys Ala Pro Pro Pro Ser Trp Asp Val Met Trp Lys Cys Leu Thr	1605	1610	1615
Arg Leu Lys Pro Thr Leu Val Gly Pro Thr Pro Leu Leu Tyr Arg Leu	1620	1625	1630

Gly Ser Val Thr Asn Glu Val Thr Leu Thr His Pro Val Thr Lys Tyr			
1635	1640	1645	
Ile Ala Thr Cys Met Gln Ala Asp Leu Glu Val Met Thr Ser Thr Trp			
1650	1655	1660	
Val Leu Ala Gly Gly Val Leu Ala Ala Val Ala Ala Tyr Cys Leu Ala			
1665	1670	1675	1680
Thr Gly Cys Val Cys Ile Ile Gly Arg Leu His Ile Asn Gln Arg Ala			
1685	1690	1695	
Val Val Ala Pro Asp Lys Glu Val Leu Tyr Glu Ala Phe Asp Glu Met			
1700	1705	1710	
Glu Glu Cys Ala Ser Arg Ala Ala Leu Ile Glu Glu Gly Gln Arg Ile			
1715	1720	1725	
Ala Glu Met Leu Lys Ser Lys Ile Gln Gly Leu Leu Gln Gln Ala Ser			
1730	1735	1740	
Lys Gln Ala Gln Asp Ile Gln Pro Thr Val Gln Ala Ser Trp Pro Lys			
1745	1750	1755	1760
Val Glu Gln Phe Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile			
1765	1770	1775	
Gln Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Val Ala			
1780	1785	1790	
Ser Met Met Ala Phe Ser Ala Ala Leu Thr Ser Pro Leu Ser Thr Ser			
1795	1800	1805	
Thr Thr Ile Leu Leu Asn Ile Leu Gly Gly Trp Leu Ala Ser Gln Ile			
1810	1815	1820	
Ala Pro Pro Ala Gly Ala Thr Gly Phe Val Val Ser Gly Leu Val Gly			
1825	1830	1835	1840
Ala Ala Val Gly Ser Ile Gly Leu Gly Lys Val Leu Val Asp Ile Leu			
1845	1850	1855	
Ala Gly Tyr Gly Ala Gly Ile Ser Gly Ala Leu Val Ala Phe Lys Ile			
1860	1865	1870	
Met Ser Gly Glu Lys Pro Ser Met Glu Asp Val Val Asn Leu Leu Pro			
1875	1880	1885	

Gly Ile Leu Ser Pro Gly Ala Leu Val Val Gly Val Ile Cys Ala Ala			
1890	1895	1900	
Ile Leu Arg Arg His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met			
1905	1910	1915	1920
Asn Arg Leu Ile Ala Phe Ala Ser Arg Gly Asn His Val Ala Pro Thr			
	1925	1930	1935
His Tyr Val Thr Glu Ser Asp Ala Ser Gln Arg Val Thr Gln Leu Leu			
	1940	1945	1950
Gly Ser Leu Thr Ile Thr Ser Leu Leu Arg Arg Leu His Asn Trp Ile			
	1955	1960	1965
Thr Glu Asp Cys Pro Ile Pro Cys Gly Gly Ser Trp Leu Arg Asp Val			
	1970	1975	1980
Trp Asp Trp Val Cys Thr Ile Leu Thr Asp Phe Lys Asn Trp Leu Thr			
1985	1990	1995	2000
Ser Lys Leu Phe Pro Lys Met Pro Gly Leu Pro Phe Val Ser Cys Gln			
	2005	2010	2015
Lys Gly Tyr Lys Gly Val Trp Ala Gly Thr Gly Ile Met Thr Thr Arg			
	2020	2025	2030
Cys Pro Cys Gly Ala Asn Ile Ser Gly Asn Val Arg Leu Gly Ser Met			
	2035	2040	2045
Arg Ile Thr Gly Pro Lys Thr Cys Met Asn Ile Trp Gln Gly Thr Phe			
	2050	2055	2060
Pro Ile Asn Cys Tyr Thr Glu Gly Gln Cys Val Pro Lys Pro Ala Pro			
2065	2070	2075	2080
Asn Phe Lys Val Ala Ile Trp Arg Val Ala Ala Ser Glu Tyr Ala Glu			
	2085	2090	2095
Val Thr Gln His Gly Ser Tyr His Tyr Ile Thr Gly Leu Thr Thr Asp			
	2100	2105	2110
Asn Leu Lys Val Pro Cys Gln Leu Pro Ser Pro Glu Phe Phe Ser Trp			
	2115	2120	2125
Val Asp Gly Val Gln Ile His Arg Phe Ala Pro Thr Pro Lys Pro Phe			
	2130	2135	2140



Phe Arg Asp Glu Val Ser Phe Cys Val Gly Leu Asn Ser Phe Val Val  
2145                      2150                      2155                      2160

Gly Ser Gln Leu Pro Cys Asp Pro Glu Pro Asp Thr Asp Val Leu Met  
                         2165                      2170                      2175

Ser Met Leu Thr Asp Pro Ser His Ile Thr Ala Glu Thr Ala Ala Arg  
                         2180                      2185                      2190

Arg Leu Ala Arg Gly Ser Pro Pro Ser Glu Ala Ser Ser Ser Ala Ser  
                         2195                      2200                      2205

Gln Leu Ser Ala Pro Ser Leu Arg Ala Thr Cys Thr Thr His Gly Lys  
                         2210                      2215                      2220

Ala Tyr Asp Val Asp Met Val Asp Ala Asn Leu Phe Met Gly Gly Asp  
2225                      2230                      2235                      2240

Val Thr Arg Ile Glu Ser Gly Ser Lys Val Val Val Leu Asp Ser Leu  
                         2245                      2250                      2255

Asp Pro Met Val Glu Glu Arg Ser Asp Leu Glu Pro Ser Ile Pro Ser  
                         2260                      2265                      2270

Glu Tyr Met Leu Pro Lys Lys Arg Phe Pro Pro Ala Leu Pro Ala Trp  
                         2275                      2280                      2285

Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Ser Trp Lys Arg Pro  
                         2290                      2295                      2300

Asp Tyr Gln Pro Ala Thr Val Ala Gly Cys Ala Leu Pro Pro Pro Arg  
2305                      2310                      2315                      2320

Lys Thr Pro Thr Pro Pro Pro Arg Arg Arg Arg Thr Val Gly Leu Ser  
                         2325                      2330                      2335

Glu Asp Ser Ile Gly Asp Ala Leu Gln Gln Leu Ala Ile Lys Ser Phe  
                         2340                      2345                      2350

Gly Gln Pro Pro Pro Ser Gly Asp Ser Gly Leu Ser Thr Gly Ala Gly  
                         2355                      2360                      2365

Ala Ala Asp Ser Gly Ser Gln Thr Pro Pro Asp Glu Leu Ala Leu Ser  
                         2370                      2375                      2380

Glu Thr Gly Ser Ile Ser Ser Met Pro Pro Leu Glu Gly Glu Leu Gly  
2385                      2390                      2395                      2400

Asp Pro Asp Leu Glu Pro Glu Gln Val Glu Pro Gln Pro Pro Pro Gln  
 2405 2410 2415  
 Gly Gly Val Ala Ala Pro Gly Ser Asp Ser Gly Ser Trp Ser Thr Cys  
 2420 2425 2430  
 Ser Glu Glu Asp Asp Ser Val Val Cys Cys Ser Met Ser Tyr Ser Trp  
 2435 2440 2445  
 Thr Gly Ala Leu Ile Thr Pro Cys Ser Pro Glu Glu Glu Lys Leu Pro  
 2450 2455 2460  
 Ile Asn Pro Leu Ser Asn Ser Leu Leu Arg Tyr His Asn Lys Val Tyr  
 2465 2470 2475 2480  
 Cys Thr Thr Thr Lys Ser Ala Ser Leu Arg Ala Lys Lys Val Thr Phe  
 2485 2490 2495  
 Asp Arg Met Gln Val Leu Asp Ser Tyr Tyr Asp Ser Val Leu Lys Asp  
 2500 2505 2510  
 Ile Lys Leu Ala Ala Ser Lys Val Thr Ala Arg Leu Leu Thr Met Glu  
 2515 2520 2525  
 Glu Ala Cys Gln Leu Thr Pro Pro His Ser Ala Arg Ser Lys Tyr Gly  
 2530 2535 2540  
 Phe Gly Ala Lys Glu Val Arg Ser Leu Ser Gly Arg Ala Val Asn His  
 2545 2550 2555 2560  
 Ile Lys Ser Val Trp Lys Asp Leu Leu Glu Asp Ser Glu Thr Pro Ile  
 2565 2570 2575  
 Pro Thr Thr Ile Met Ala Lys Asn Glu Val Phe Cys Val Asp Pro Thr  
 2580 2585 2590  
 Lys Gly Gly Lys Lys Ala Ala Arg Leu Ile Val Tyr Pro Asp Leu Gly  
 2595 2600 2605  
 Val Arg Val Cys Glu Lys Met Ala Leu Tyr Asp Ile Thr Gln Lys Leu  
 2610 2615 2620  
 Pro Gln Ala Val Met Gly Ala Ser Tyr Gly Phe Gln Tyr Ser Pro Ala  
 2625 2630 2635 2640  
 Gln Arg Val Glu Phe Leu Leu Lys Ala Trp Ala Glu Lys Lys Asp Pro  
 2645 2650 2655

Met Gly Phe Ser Tyr Asp Thr Arg Cys Phe Asp Ser Thr Val Thr Glu  
 2660 2665 2670

Arg Asp Ile Arg Thr Glu Glu Ser Ile Tyr Arg Ala Cys Ser Leu Pro  
 2675 2680 2685

Glu Glu Ala His Thr Ala Ile His Ser Leu Thr Glu Arg Leu Tyr Val  
 2690 2695 2700

Gly Gly Pro Met Phe Asn Ser Lys Gly Gln Thr Cys Gly Tyr Arg Arg  
 2705 2710 2715 2720

Cys Arg Ala Ser Gly Val Leu Thr Thr Ser Met Gly Asn Thr Ile Thr  
 2725 2730 2735

Cys Tyr Val Lys Ala Leu Ala Ala Cys Lys Ala Ala Gly Ile Ile Ala  
 2740 2745 2750

Pro Thr Met Leu Val Cys Gly Asp Asp Leu Val Val Ile Ser Glu Ser  
 2755 2760 2765

Gln Gly Thr Glu Glu Asp Glu Arg Asn Leu Arg Ala Phe Thr Glu Ala  
 2770 2775 2780

Met Thr Arg Tyr Ser Ala Pro Pro Gly Asp Pro Pro Arg Pro Glu Tyr  
 2785 2790 2795 2800

Asp Leu Glu Leu Ile Thr Ser Cys Ser Ser Asn Val Ser Val Ala Leu  
 2805 2810 2815

Gly Pro Gln Gly Arg Arg Arg Tyr Tyr Leu Thr Arg Asp Pro Thr Thr  
 2820 2825 2830

Pro Ile Ala Arg Ala Ala Trp Glu Thr Val Arg His Ser Pro Val Asn  
 2835 2840 2845

Ser Trp Leu Gly Asn Ile Ile Gln Tyr Ala Pro Thr Ile Trp Ala Arg  
 2850 2855 2860

Met Val Leu Met Thr His Phe Phe Ser Ile Leu Met Ala Gln Asp Thr  
 2865 2870 2875 2880

Leu Asp Gln Asn Leu Asn Phe Glu Met Tyr Gly Ala Val Tyr Ser Val  
 2885 2890 2895

Ser Pro Leu Asp Leu Pro Ala Ile Ile Glu Arg Leu His Gly Leu Asp  
 2900 2905 2910

Ala Phe Ser Leu His Thr Tyr Thr Pro His Glu Leu Thr Arg Val Ala  
2915 2920 2925

Ser Ala Leu Arg Lys Leu Gly Ala Pro Pro Leu Arg Ala Trp Lys Ser  
2930 2935 2940

Arg Ala Arg Ala Val Arg Ala Ser Leu Ile Ser Arg Gly Gly Arg Ala  
2945 2950 2955 2960

Ala Val Cys Gly Arg Tyr Leu Phe Asn Trp Ala Val Lys Thr Lys Leu  
2965 2970 2975

Lys Leu Thr Pro Leu Pro Glu Ala Arg Leu Leu Asp Leu Ser Ser Trp  
2980 2985 2990

Phe Thr Val Gly Ala Gly Gly Gly Asp Ile Tyr His Ser Val Ser Arg  
2995 3000 3005

Ala Arg Pro Arg Leu Leu Leu Phe Gly Leu Leu Leu Leu Phe Val Gly  
3010 3015 3020

Val Gly Leu Phe Leu Leu Pro Ala Arg  
3025 3030